The factor analysis for the code word Universe also produced three factors. One consisted of the six word-pairs of Interesting and Valuable. The second factor consisted only of the three word-pairs called Order. The third factor included the word-pairs of the subscales called Safe, Understandable, and Easy. These three factors account for 92% of the variance. As would be expected, the intercorrelation coefficients for the scales which form these factors were fairly high, ranging from around 0.35 up to 0.6 to 0.7 for the Interesting-Valuable combinations.

For formation of the scale scores and the factor scores, the scores on negative word-pairs have been inverted so that a score of 7 represents positive attitudes.

Science and Society

A new scale of twenty items on Science and Society was added to probe the current opinions of these young adults. The scales present five options between Strongly Agree and Strongly Disagree to items such as: "Sending men to the moon is a waste of money." The statements had been planned to present ten pairs probing positive and negative responses on ten dimensions. The responses showed that the paired statements were not actually antithetical; the highest correlations on paired statements were -0.66 for pair 1-9, and -0.75 for pair 2-12. All other pair correlations were less than -0.40. A factor analysis of the responses produced two factors. The first factor of seven statements (statements 2, 4, 5, 10, 12, 15 and 18) seems to deal with Science in General and Society. The second factor of four statements (numbers 1, 8, 9, 17) seems to deal with Physics and Society, for the items in this factor are the only ones including the word "physics." Thus, the

NATIONAL ASSOCIATION FOR RESEARCH IN SCIENCE TEACHING (NARST)
Detroit, Michigan March 28, 1973
Hotel Hilton - 3
1:30 pm to 2:40 pm

FOUR-YEAR FOLLOW-UP ON PHYSICS STUDENTS

A Preliminary Report

Fletcher G. Watson
Harvard University

What has become of the many physics students who participated during 1967-68 in the experimental year of Harvard Project Physics? What have they done? How do they now look at science, physics, and society?

Because the original experimental design included plans for a follow-up, the names and home addresses of 3,150 students in the three teacher groups: first-year Project Physics trial, control, and experienced Project Physics were stored on IBM cards. In the spring of 1972, with the help of Drs. Bud Stone and John Mayfield, an eight-page questionnaire was designed and mailed to the 3,150 on our list. After a month a second mailing was made to those who had not replied. Of the original mailing 350 were returned as not deliverable, so 2,800 were delivered somewhere. From all over the world replies were returned and eventually totaled close to 1,600, which is 57% of those delivered.

Some attributes of the original population and of the respondents are shown in Table 1. Remember that these were students who had elected to enroll in a physics course. The

three teacher-groups were: those called Experienced - a diverse group of teachers who had taught the course previously during the formative stages, those identified by a national random sampling of physics teachers who were divided between Controls, who used their previous course, and Trial teachers using the Project Physics Course for the first time. The responses are not biased by course taken or by sex.

Stored Data

The data about the participants which was stored in 1968 is shown in Table 2. End-of-year data (Post) were used in addition to the personality data gathered in the middle of the trial year. The testing pattern designed by Welch and Walberg ("A Design for Curriculum Evaluation," Science Education 52, 10, 1968) provided, on a random basis within and between classes, scores on a particular test for only half the students. When class mean scores were treated by Welch and Walberg, multivariate analysis was appropriate. But here we are considering combinations of scores of individuals and because we do not have all scores on any individual, we have used correlations, multiple regressions and two and three-way analyses of variance. Mr. Joseph Bastian has been most helpful with the many computer runs.

Follow-up Data

In addition to a request for demographic data, the follow-up questionnaire included three of the same scales answered by the students during 1967-68. These were the Participant Activity

---

Our data bank also includes comparable information on the teachers. In our next round of analyses we expect to examine interactions between the teacher scores and a variety of student scores, both Post and Follow-up.

Inventory (PAI), and the two most significant scales of the semantic differential: Physics, and Universe. In addition, a new scale on Science and Society was added.

The Participant Activity Inventory consists of 16 activities such as "Read newspaper articles concerning scientific things" which were scored from "Never" (1) to "at least once a week" (5). Only a mean score per student had been stored. For the follow-up four additional items concerned with activities in writing, painting, art appreciation, and musical concerts were added. Analyses have been made with both the total original 16-item PAI scores and separately with the four items added for the follow-up.

The semantic differential tests, as shown in Table 3, consist of eighteen word and antonym pairs. In the basic data these were combined by Geis into six subscales each of three word-pairs. These subscales are identified as: Interesting, Valuable, Easy, Safe, Orderly, and Understandable. Because only scores on those subscales exist in the data bank, the follow-up responses were treated on those subscales.

A factor analysis of the follow-up showed, however, considerable overlapping between the subscales. On the code word Physics, the six word-pairs comprising the scales Interesting and Valuable formed a factor. The second factor for Physics included, with the highest weights on that factor, the three word-pairs of the scale Easy, plus two of the word-pairs of Understandable. The third factor included the three word pairs of Order, two from Safe, and one from Understandable. The three factors include 93% of the variance.

The factor analysis for the code word Universe also produced three factors. One consisted of the six word-pairs of Interesting and Valuable. The second factor consisted only of the three word-pairs called Order. The third factor included the word-pairs of the subscales called Safe, Understandable, and Easy. These three factors account for 92% of the variance. As would be expected, the intercorrelation coefficients for the scales which form these factors were fairly high, ranging from around 0.35 up to 0.6 to 0.7 for the Interesting-Valuable combinations.

For formation of the scale scores and the factor scores, the scores on negative word-pairs have been inverted so that a score of 7 represents positive attitudes.

Science and Society

A new scale of twenty items on Science and Society was added to probe the current opinions of these young adults. The scales present five options between Strongly Agree and Strongly Disagree to items such as: "Sending men to the moon is a waste of money." The statements had been planned to present ten pairs probing positive and negative responses on ten dimensions. The responses showed that the paired statements were not actually antithetical; the highest correlations on paired statements were -0.66 for pair 1-9, and -0.75 for pair 2-12. All other pair correlations were less than -0.40. A factor analysis of the responses produced two factors. The first factor of seven statements (statements 2, 4, 5, 10, 12, 15 and 18) seems to deal with Science in General and Society. The second factor of four statements (numbers 1, 8, 9, 17) seems to deal with Physics and Society, for the items in this factor are the only ones including the word "physics." Thus, the

respondents appear to differentiate between Science and Physics.

For the analysis, scores on the negative statements have been inverted to a postive scale with a score of 5 representing Strongly Agree.

Representativeness

From the information stored on each student in 1968 we have examined the extent to which the Respondents are representative of the total student population involved during the trial years. Table 4 shows that the Respondents had significantly higher IQ scores. Also, their grades in high school physics averaged a shade higher, closer to B- than to C+ of the Non-Respondents. Respondents also had higher scores in 1968 on TOUS, on the Participant Activity Inventory (PAI), and on the semantic differential scales Physics: Interesting, Orderly, and Understandable; and on Universe: Orderly.

For the Respondents both college entrance and scientific careers are correlated, see Table 5, with IQ scores which are higher for Respondents than for Non-Respondents. Therefore, we suspect that fewer of the Non-Respondents entered college and fewer chose scientific careers.

Results

With a wealth of information available, a major question has been what to investigate and what to report in a brief paper. Our primary emphasis today is upon the changes occurring in the expressed attitudes of this interesting population of academically promising young adults, and what, if any, association can be made with the particular physics course taken four years earlier in high school. Sex differences in scores will also be noted where

they seem to be especially interesting. A probability criterion of $p \leq 0.01$ has been applied in selecting results to report.

Unless otherwise noted, students of Experienced (Project Physics) Teachers have been dropped from the analysis. These teachers were a diversified group chosen to assist in the formative evaluation of the course materials. Since they are not a representative sample of all physics teachers, inclusion of their students would distort the sample from a nationwide random sample of physics teachers.

Replies by Teachers

The distribution of percentage responses by teacher and course are shown in Figure 1. The mean values by course group, based on the total students in each group for whom Post data were stored are: Trial teachers, 48%; Control teachers, 36%; and Experienced teachers, 40%. There are no statistically significant differences by course.

The sizable spread in percentage respondents by teacher raises a number of questions for further study. We plan to examine this spread in terms of teacher academic background, personality parameters, classroom climate (LEI), and perhaps characteristics of the students who did respond.

Demographic

Of 1,571 respondents, 1,453 had entered some college, and 284 had dropped out, mainly after the second, third or fourth semester. Of the college entrants 89% had enrolled in a four-year college. Overall 60% hoped to enter graduate school. As Table 6 shows, their academic interests were very diversified, with 25% majoring in a science or engineering. Of the Respondents

711, or 49%, said they had considered a collegiate major in science, and 166 had considered a major in physics. The distributions in neither Table 5 nor Table 6 are related to the physics course taken.

Philosophy-Sociology of Science

A course in the philosophy of science or the sociology of science were elected in college by a disproportionately large number of students from the Project Physics Trial group. For philosophy the probability of this occurring by chance was $p = 0.04$, but for Sociology of Science the chance was down to $p = .0005$. For both of these courses the enrollment of males was relatively high.

Participant Activity Inventory - PAI

Because the Participant Activity Inventory deals with self-initiated efforts, it may have a special value as a measure of scientific interest. The PAI scores are persistent, for PAI-FUP (16) is correlated with PAI-Post, $r = 0.57$, with little difference between sexes.

Furthermore, the PAI-Post scores are related to the academic majors of these students. The PAI scores differ from the overall mean, in standard deviations, for Physical Science majors by 1.04, for Chemistry majors by 0.38, but surprisingly not at all for Engineering majors. With the PAI-FUP scores some changes in ranking and association occurred. The greatest displacement was then for Chemistry majors 0.67 sd, 0.48 for Biology-Geology majors, and 0.46 for Physical Science majors, while for Engineering majors it still remained at the mean of the entire population of

Respondents who entered college. The greatest negative displacement was for Business-Law at -0.43 sd. Thus it seems that the (Scientific) Activity Index differs somewhat for males and females, remains fairly stable over the years, and is rather strongly associated with long-term career interests.

The four culturally oriented items added to the PAI for the follow-up were for males fairly strongly correlated with their 1968 scores on the PAI-Post-16, (r about 0.35). For females the relation is quite different, PAI-Post-16 scores had no predictive value on PAI-FUP. But females who scored high on the four cultural activities were strongly anti-authoritarian ($r=-0.60$). Apparently, active males are active in a wide variety of contexts, but the female population is more heterogeneous in its choices.

<u>Science and Society</u> - <u>Results</u>

The mean scores of the total of 1,571 usable responses from students with the three teacher groups appears in Table 7 . On the individual items Respondents:

- like their physics course (1 & 9),
- were neutral to negative on space exploration (2 & 12),
- disagreed that more science should be required in college (3),
- agreed with objections to the Amchitka nuclear test (4),
- were neutral on the values of computers (5),
- were optimistic that science and technology could solve the environmental crisis (6),
- were favorably inclined toward medical science (7 & 13),
- disagreed that physics is devoid of emotional involvement (8), (females scored lower)
- were neutral on trust of governmental policies on secrecy (10),

were neutral on job opportunities in science (11), (females scored lower),

disagreed that the study of science was not necessary for successful living (14) (females scored lower),

disagreed slightly that nuclear testing be continued (15),

were neutral on science threatening the rights of individuals (16),

found physics intellectually rewarding (17),

expected pollution to be solved by scientific efforts (18),

agreed that scientific results be freely available to the public (19), and

agreed that science offers extensive career opportunities (20), (females scored higher).

The only difference between the Project Physics Trial and Control courses was on Item 9 where the former Project Physics students rated the negative statement 1.79 while the controls rated it 2.18 (s.e. of means is about 0.05, $p < 0.001$).

When the Science and Society responses were divided into the two factors, that termed Physics and Society had significant differences ($p = 0.001$) for major subject, sex, and course. Females scored higher, as did Project Physics students compared to the controls.

Scores on the factor Science in General and Society were not significantly different by course or sex, but were strongly associated with career intentions ($p = .004$). A statistically significant difference ($p = 0.002$) was caused mainly by non-scientists with the Experienced Project Physics teachers. (See Table 8.)

Semantic Differential

Figures 2 and 3 present the time changes, 1968-72, of responses of this interesting group of young adults to two semantic differential scales: Physics and Universe. No significant differences appear by physics course taken, although the Project Physics Trial students had larger changes on Physics: Orderly and Understandable.

The changes by sex and for the total group of all Respondents as shown in Figure 3, are overwhelming. Table 9 summarizes the results. Between high school in 1968 and 1972 the entire set of Respondents moved significantly ($p = 0.01$ to 10^{-7}) on seven of twelve scales. They have come to see Physics as Easier, but less Safe (mainly the males) and the subject both more Orderly and Understandable. They also see Universe as less Valuable, less Orderly, but more Understandable. The other sex differences were for females who, compared to males, who see Physics as more Understandable, but the Universe as less Orderly and Understandable. The interpretation of these results is going to take more time than we have had, so wait for our next report. But something dramatic has happened. Are these effects the result of maturing - essentially an age factor? Are they specific to the youth culture in which these young people have matured? What underlies the several strong sex differences - anticipated social role?, career conflicts?, collegiate experiences?, or what? Would another sample having rather different academic background show a similar pattern? How would current high school seniors react? We have found only the top of a great iceberg; much more exploration will be needed before any explanations become acceptable.

NATIONAL ASSOCIATION FOR RESEARCH IN SCIENCE TEACHING (NARST)
Hotel Hilton - 3 March 28, 1973
Detroit, Michigan 1:30 pm to 2:40 pm

SUMMARY

Sixteen hundred young adults, who were enrolled in high school physics courses in 1968, have recently responded to a follow-up questionnaire. Responses from all over the world were received from 56% of the original group. The responses were not biased by sex or particular course taken, but the Respondents, compared to the Non-Respondents, were a bit brighter, and had received a bit higher grade in physics, and had scored higher on several tests. Although not a representative sample of all physics students, the Respondents comprise a sample of academically promising young adults maturing in the present youth culture.

Patterns of self-initiated, science-related activities persisted during four years for the males, and showed relations to their intended careers in science, but not in engineering. Males involved in science activities were also involved in more general cultural activities. Females showed a greater diversity; those most involved in cultural activities were marked by strong anti-authoritarianism.

Respondents made a clear distinction between Physics and Science, with Physics having a career bias. Those who had been enrolled four years earlier in the Project Physics course more strongly would recommend it to someone they liked.

Attitudes were not linked to which particular high school physics course had been taken four years earlier. But astonishingly large changes in attitudes occurred for the entire group of Respondents. During four years their attitudes had shifted toward Physics as more Orderly and Understandable. Although the Universe was now seen as less Orderly, still it too was more Understandable. These dramatic changes and several significant sex differences in scores will be the subject of further studies.

Final

If any one has an interest in using these data as the basis for your own studies, let me know. Computer print-outs can be supplied inexpensively. In addition, the various data-gathering devices are available for your use. I am most curious about what patterns would appear if quite different populations of students and teachers were tested. What would you find for a group of biology teachers and their students?, or for a different sample of college students? What would you find for adult members of a PTA? Since I cannot possibly carry out many such studies, I would be pleased to cooperate with you or your students.

TABLE 1

Teachers of Course Type	Male	Female	Total
HPP Trial	1211 (47)*	372 (41)	1583 (43)
Follow-up	588 (51)	178 (42)	766 (49)
Control	650 (23)	184 (20)	834 (23)
Follow-up	218 (19)	80 (19)	298 (19)
HPP Experienced	918 (33)	353 (39)	1271 (38)
Follow-up	345 (30)	162 (39)	507 (32)
Total	2779 (75)	909 (25)	3688
Follow-up	1151 (73)	420 (27)	1571 (42.9)

*Percent of column

TABLE 2

Data Available

Post (1967-68)	Follow-up
Participant Activity Inventory (PAI) Mean of 16 items	PAI Same 16 items, plus 4 new
Semantic Differential (SD)	SD
6 subscales of 3 items each for:	
Physics	Physics
Universe	Universe
Being a Physicist	
Doing Lab Experiments	Science & Society
Learning About Science	20 items yielding
Myself as a Physics Student	2 subscales:
Solving Physics Problems	Science in General and Society,
Physics (forced choice) (15 items)	Physics and Society
IQ Score	Demographic:
Final grade physics course	College Enrollment
Learning Environment Inventory (LEI) (14 scale scores)	Major Graduate Study
Allport-Vernon-Lindzey (AVL) (96 scale scores)	
Physics Achievement Test (PAT)	
Test on Understanding Science (TOUS)	
Science Process Inventory (SPI)	
Personal Opinion Survey (POS) (7 scale scores)	
Academic Interest Measure (AIM)	
Student Questionnaire (SQ) (60 items)	

TABLE 4

Respondents vs. Non-Respondents

1968 means for	Respondents	Non-Respondents	p
I.Q. Score	119.[illegible]	114.6	$<.001$
Grade, physics	8.57	7.75	$<.001$
TOUS	37.46	33.9[illegible]	$<.001$
PAI	2.65	2.55	.02
SD Physics			
Interesting	4.96	4.67	.003
Orderly	5.02	4.78	.002
Understandable	4.23	4.05	.03
Universe			
Orderly	5.44	5.18	.003

TABLE 5

Academic Intentions by Sex and Course

Academic Intentions	Males		Females	
	Trial	Control	Trial	Control
Major in Science or Technology	233 (47)*	92 (47)	36 (23)	24 (34)
Considered Science or Technology	95 (17)	33 (17)	43 (27)	16 (23)
No.	190 (36)	68 (36)	78 (50)	30 (43)
Total	518	193	157	70

*%of column

6.4

TABLE 6

Distribution of Collegiate Majors

(N = 1388)	Σ N	(Females)	%
Science:			
Biology & Geology	132	(27)	9.2
Chemistry	42	(10)	2.9
Physics & Astronomy	37	(3)	2.6
Engineering	154	(9)	10.7
Mathematics Computers	103	(27)	7.2
Pre-Medecine & Nursing	102	(60)	7.1
Social Sciences & Religion	265	(56)	18.5
Literature	67	(34)	4.7
Psychology	83	(29)	5.8
Education	130	(85)	9.0
Business, Law	168	(12)	11.7
Fine Arts	106	(21)	7.4

TABLE 7

Interaction of Scores on Science in General and Society scale with Academic Intentions and with Physics Course

(N = 1373)

Academic Intentions	Mean*	Course (p = .002) Trial	Control	Experienced
	(p=.004)			
Science	3.13	3.24	3.09	3.08
Considered but No	3.17	3.28	3.28	2.94
No	2.97	2.96	3.09	2.87

*In the formation of mean scores, those on scales that were originally negative were inverted to a positive bias.

No sex differences were found.

TABLE 8

Interaction of Physics and Society with Academic Intentions, Course, and Sex

(N=1374)

Academic Major	Mean	Course (p=.003) Trial	Control	Exp'd	Sex (p=.001) Male	Female
	(p=.001)					
Science	3.80	3.79	3.82	3.78	3.64	3.93
Perhaps No	3.83	3.94	3.58	3.98	3.90	4.05
No	3.60	3.70	3.43	3.67	3.48	3.85

TABLE 9

SD Changes

Respondents: Total and by Sex

Scale	(p) All R's	Direction	Males		Females	
PHYSICS						
Interesting	---	---	---	---	10^{-2}	more
Valuable	---	---	---	---	---	---
Easy	.01	more	---	---	$<.01$	more
Safe	$<.01$	less	$<.01$	less	---	---
Orderly	10^{-7}	more	10^{-6}	more	10^{-8}	more
Understandable	10^{-7}	more	10^{-6}	more	10^{-10}	more
UNIVERSE						
Interesting	---	---	---	---	---	---
Valuable	$<.001$	less	10^{-3}	less	10^{-3}	less
Easy	---	---	---	---	$<.01$	less
Safe	---	---	---	---	---	---
Orderly	10^{-4}	less	10^{-3}	less	10^{-4}	less
Understandable	10^{-4}	more	10^{-5}	more	10^{-2}	more

Figure 1

Percentage of Student Replies by Teacher Group

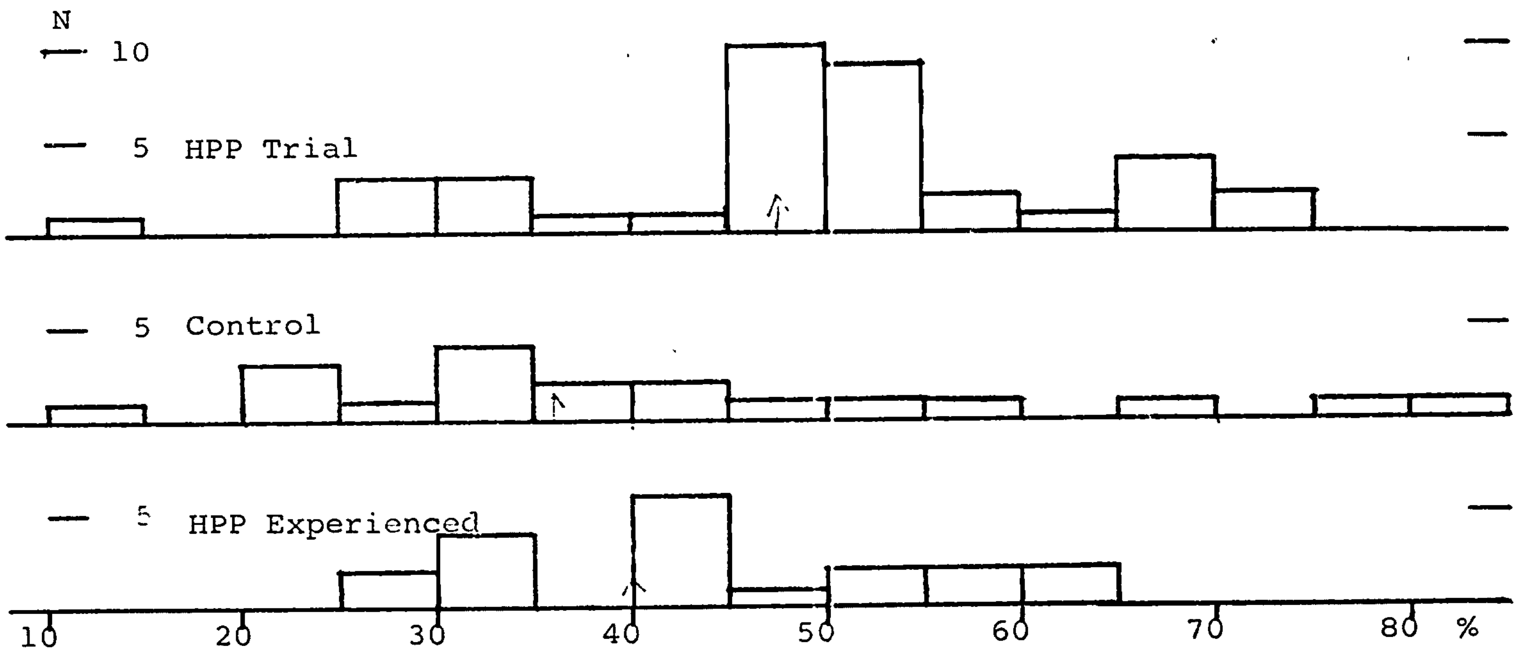


FIGURE 2

Changes in Attitudes of Physics Students 1968-72 by Course

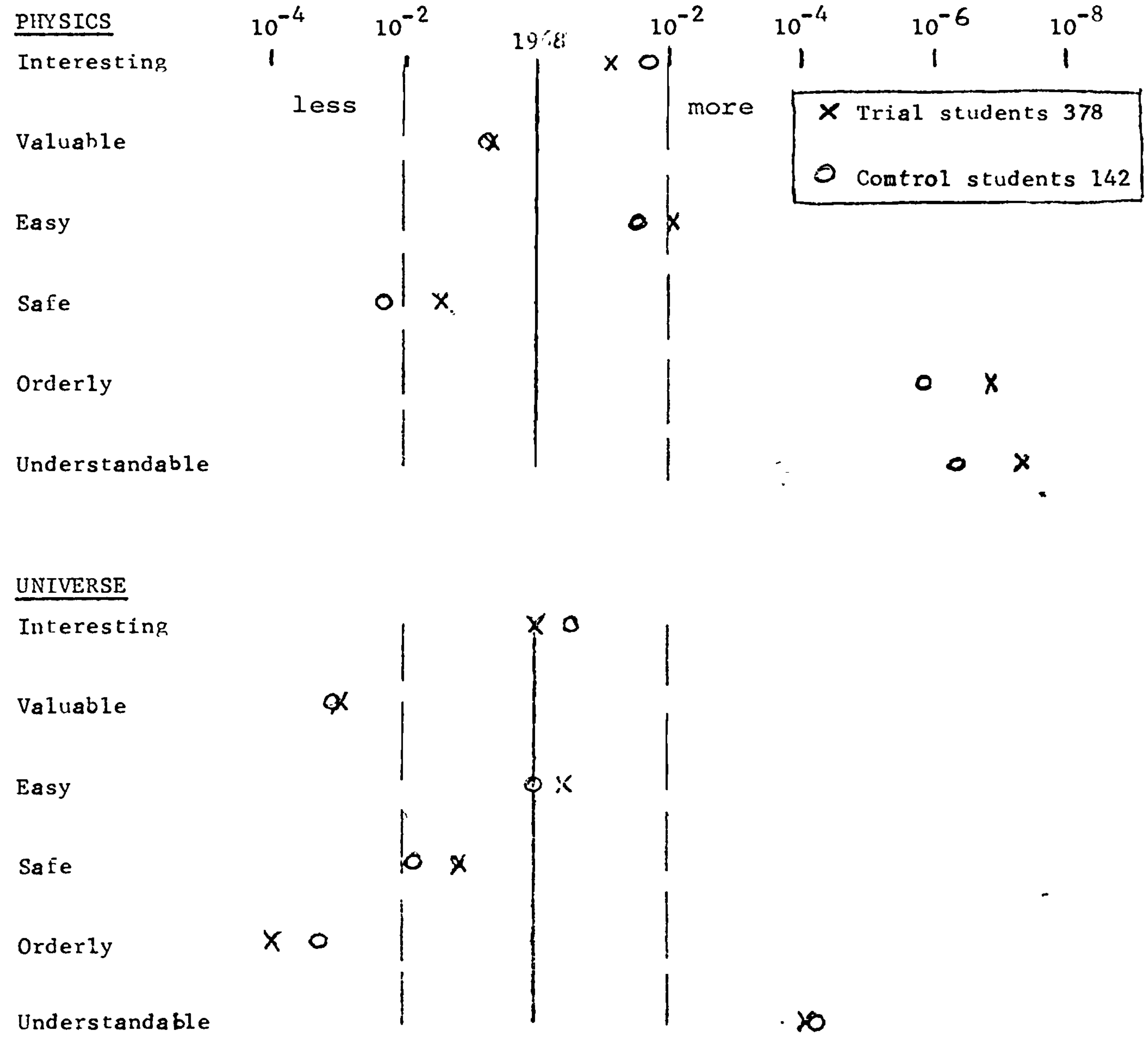
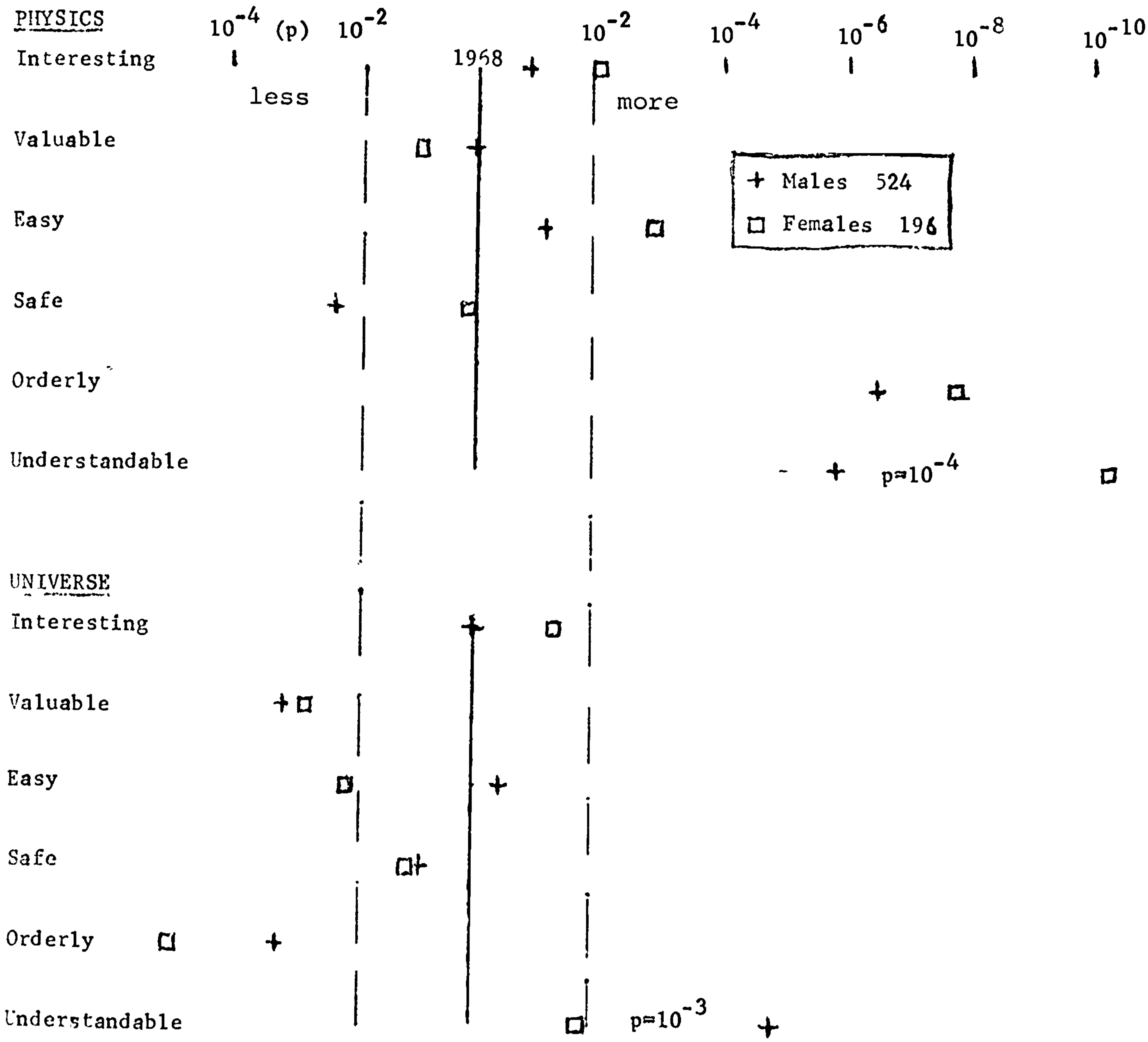


FIGURE 3

Changes in Attitudes of Physics Students 1968-72 by Sex



Project Physics Longfellow Hall Harvard University Cambridge, Massachusetts 02138

Remember your high school physics course? You either took Project Physics (Harvard) or were in a class which was used as a control group in a study of Project Physics. Well, we're back again. This time we want to find out what has happened to you in the past four years. But we need your help. Here's what we're hoping you'll do.

1. Complete the questionnaire (pages 1&2), 3 mins.
2. Read the instructions (p.2) and check off the scales (p.3&4), 2 mins.
3. Fill out the Participant Activity Inventory (p.5&6) and, 3 mins.
4. Complete the 'Science and Society Scale' (p.7&8). 4 mins.

Total: about 12 mins.

If you like, please add any comments you think might be helpful (p.8). We will be very grateful if you will return the completed booklet within a week after you receive it. There's a stamped addressed envelope enclosed.

Many thanks, Fletcher Watson Fletcher G. Watson
Director, Project Physics

INFORMATION QUESTIONNAIRE

In high school I took (check one):
Project Physics(Harvard)__ PSSC__ A Traditional Course__ Chicago Physics Study___.

A. COMPLETE THIS SECTION IF YOU DID NOT ATTEND COLLEGE AT ALL.

1. I work full time__ part-time___.
2. Type of job___________________.
3. I plan to go to college later. Yes__ No___.
4. My career plans for the next five years are______________________________
   ____
5. My involvement in Military Service has been None__ Drafted__ Enlisted______
6. My job in the service was____
7. My involvement in volunteer service organizations has been None___________
   ___year(s) in Peace Corps___year(s) in VISTA, other (specify_______________

B. COMPLETE THIS SECTION IF YOU ATTEND(ED) COLLEGE.

8. I enrolled in a ___Liberal Arts College (University)
   ___Teachers College
   ___Technical Institute
   ________________Other (please specify)

9. It is a
   ___2 yr. college
   ___4 yr. college
   _____Other, specify

10. My major area of study was in the general field of

Social Sci.	___	Science	
History	___	Physics	___
English	___	Chemistry	___
Language	___	Biology	___
Math	___	Earth Sci.	___
Other(specify)	___	Other Sci.	___
		Specify	___________

11. The most specific name of my major field of study is ___________
12. My minor field of study (and/or interest) is ___________
13. I plan to do graduate studies: Yes___No___. If yes, in the field of ___________
14. I seriously considered majoring in science Yes___No___
15. I seriously considered majoring in Physics Yes___No___
16. I took a course(s) in the Philosophy or History of Science Yes___No___
17. I took a course in the Sociology of Science Yes___No___
18. I have received the degree ___________
19. In the near future I will receive the degree of ___________
20. I dropped out of college: Yes___ No___. If yes, I completed___semesters. [If you dropped out of college and now work, PLEASE GO BACK to Section "A" and complete it.]

INSTRUCTIONS FOR THE NEXT TWO PAGES

The next two pages contain pairs of words that you will use to describe your image of the heading at the top of each page. There are no "right" or "wrong" answers. Each pair of words will be on a scale which looks like this:

QUICK ☐ ☐ ☐ ☐ ☐ ☐ ☐ SLOW

Please make a check in the box which best represents of how the word pair describes the heading at the top of the page. For example, if you feel that "CHEMISTRY" is only somewhat connected with "QUICK," check the scale like this:

QUICK ☐ ☑ ☐ ☐ ☐ ☐ ☐ SLOW

If you feel that "CHEMISTRY" is somewhat connected with "SLOW" or very closely connected with "SLOW," check one of the boxes nearer to "SLOW."

Look at the heading at the top of the page; get an impression of it in your mind, and then quickly work down the page checking the scales. We are interested in your first impressions, so work rapidly and do not go back and change any marks.

Be sure to check every scale and only make one check on each scale.

PHYSICS

IMPORTANT	☐	☐	☐	☐	☐	☐	☐	UNIMPORTANT
THREATENING	☐	☐	☐	☐	☐	☐	☐	COMFORTING
SIMPLE	☐	☐	☐	☐	☐	☐	☐	DIFFICULT
PRODUCTIVE	☐	☐	☐	☐	☐	☐	☐	UNPRODUCTIVE
CAREFUL	☐	☐	☐	☐	☐	☐	☐	HAPHAZARD
MONOTONOUS	☐	☐	☐	☐	☐	☐	☐	STIMULATING
EFFORTLESS	☐	☐	☐	☐	☐	☐	☐	DEMANDING
RISKY	☐	☐	☐	☐	☐	☐	☐	SECURE
MESSY	☐	☐	☐	☐	☐	☐	☐	NEAT
SAFE	☐	☐	☐	☐	☐	☐	☐	DANGEROUS
INTERESTING	☐	☐	☐	☐	☐	☐	☐	DULL
UNKNOWABLE	☐	☐	☐	☐	☐	☐	☐	KNOWABLE
VALUABLE	☐	☐	☐	☐	☐	☐	☐	WORTHLESS
CLUTTERED	☐	☐	☐	☐	☐	☐	☐	ORDERLY
UNDERSTANDABLE	☐	☐	☐	☐	☐	☐	☐	CONFUSING
BORING	☐	☐	☐	☐	☐	☐	☐	EXCITING
CLEAR	☐	☐	☐	☐	☐	☐	☐	MYSTERIOUS
HARD	☐	☐	☐	☐	☐	☐	☐	EASY

UNIVERSE

IMPORTANT	☐	☐	☐	☐	☐	☐	☐	UNIMPORTANT
THREATENING	☐	☐	☐	☐	☐	☐	☐	COMFORTING
SIMPLE	☐	☐	☐	☐	☐	☐	☐	DIFFICULT
PRODUCTIVE	☐	☐	☐	☐	☐	☐	☐	UNPRODUCTIVE
CAREFUL	☐	☐	☐	☐	☐	☐	☐	HAPHAZARD
MONOTONOUS	☐	☐	☐	☐	☐	☐	☐	STIMULATING
EFFORTLESS	☐	☐	☐	☐	☐	☐	☐	DEMANDING
RISKY	☐	☐	☐	☐	☐	☐	☐	SECURE
MESSY	☐	☐	☐	☐	☐	☐	☐	NEAT
SAFE	☐	☐	☐	☐	☐	☐	☐	DANGEROUS
INTERESTING	☐	☐	☐	☐	☐	☐	☐	DULL
UNKNOWABLE	☐	☐	☐	☐	☐	☐	☐	KNOWABLE
VALUABLE	☐	☐	☐	☐	☐	☐	☐	WORTHLESS
CLUTTERED	☐	☐	☐	☐	☐	☐	☐	ORDERLY
UNDERSTANDABLE	☐	☐	☐	☐	☐	☐	☐	CONFUSING
BORING	☐	☐	☐	☐	☐	☐	☐	EXCITING
CLEAR	☐	☐	☐	☐	☐	☐	☐	MYSTERIOUS
HARD	☐	☐	☐	☐	☐	☐	☐	EASY

PARTICIPANT ACTIVITY INVENTORY

Pages 5 and 6 are an inventory of things you do. There are no right or wrong answers. An answer is right if it is right for you. Indicate how often you have done the things mentioned in the statements, voluntarily - because you were interested, during the past year. Circle the appropriate number to show how often you have done each thing. Mark your answers as follows:

BECAUSE I WAS INTERESTED;
DURING THE PAST YEAR, I

	Never	Once	A few times	About once a month	At least once a week
0. Went Fishing	1	2	3	4	5

If, for example, you have done this about once a month, circle the number 4; if you have done this only once, circle number 2 and so on.

BECAUSE I WAS INTERESTED;
DURING THE PAST YEAR, I

	Never	Once	A few times	About once a month	At least once a week
1. Read newspaper articles concerning scientific things.	1	2	3	4	5
2. Purchased scientific materials.	1	2	3	4	5
3. Built or tinkered with science equipment.	1	2	3	4	5
4. Read Scientific American, National Geographic, or any other science magazine.	1	2	3	4	5
5. Read about the activities of a scientist.	1	2	3	4	5
6. Watched science programs.	1	2	3	4	5
7. Talked about science with scientists.	1	2	3	4	5
8. Inquired about scientific occupations.	1	2	3	4	5

BECAUSE I WAS INTERESTED;
DURING THE PAST YEAR, I

		Never	Once	A few times	About once a month	At least once a week
9.	Talked with friends about scientific topics.	1	2	3	4	5
10.	Thought about problems like how the earth, sun, stars, or life came to be.	1	2	3	4	5
11.	Spent much time on the study of some aspect of science.	1	2	3	4	5
12.	Spent time on a special science project.	1	2	3	4	5
13.	Used a library or bookstore to obtain science literature.	1	2	3	4	5
14.	Thought about such questions as "What is time?", "What is gravity?", "What is space?", "What is energy?"	1	2	3	4	5
15.	Visited a science museum.	1	2	3	4	5
16.	Inquired about the history or politics of science.	1	2	3	4	5
17.	Wrote a poem, article, play, or story.	1	2	3	4	5
18.	Painted, sculpted, or did pottery or some other crafts.	1	2	3	4	5
19.	Visited an art gallery or museum.	1	2	3	4	5
20.	Attended musical concerts or played a musical instrument seriously.	1	2	3	4	5

INSTRUCTIONS FOR THE NEXT TWO PAGES

"Science and Society"

For each of the twenty statements on page 7 and 8, there is a corresponding scale on which there are a number of marks.

Put a check along the scale at the point which best indicates the strength and direction of your opinion about the statement.

For example, if the statement was 'Fred Nurk is a nice guy' and you were more or less in agreement with the statement (not strongly agreed, nor undecided, nor in any kind of disagreement with the statement) then you would mark the scale thus:

Strongly agree	✓				Strongly disagree

SCIENCE AND SOCIETY

	Strongly agree					Strongly disagree
1. My high school physics course was very worthwhile to me.						
2. It is very important that government support for space exploration be maintained, at least at its present level.						
3. College students should be required to study more science.						
4. The public should not have objected so strongly to the nuclear test which took place at Amchitka.						
5. Computer technology will improve the quality of life for the individual.						
6. Science and technology cannot possibly solve the problems of the environmental crisis.						
7. Medical science is not keeping pace with the increase in health problems.						
8. The study of physics is devoid of emotional involvement.						

SCIENCE AND SOCIETY

	Strongly agree				Strongly disagree
9. I would definitely not recommend my high school physics course to someone I like.					
10. It is not possible to trust government policy on science because of secrecy.					
11. In the near future it will not be easy to find jobs in science.					
12. Sending men to the moon is a waste of money.					
13. Medical science is advancing at a rapid rate.					
14. The study of science is not necessary for successful living.					
15. It is essential that controlled nuclear testing be continued.					
16. Population control by scientific means does not threaten the rights of the individual.					
17. Intellectual involvement in physics is highly rewarding.					
18. Problems of air pollution will be solved by the continuing efforts of scientists.					
19. Information on any scientific research project should be freely available to the public.					
20. Science offers extensive career opportunities.					

PLEASE ADD ANY COMMENTS YOU FEEL MIGHT BE HELPFUL: